

TARGET DAMAGE ASSESSMENT, OFFICE SUMMARY

KAWASAKI AIRCRAFT PLANT - AKASHI (1547)

19 Jan. 64 A/C, of 80 airborne, visually bombed Kawasaki with 156 tons of bombs. Excellent results were obtained with concentrations of bursts in the engine plant, assembly plant, warehousing area and dispersed area. The engine plant received the bulk of the hits with 58 percent of the roof area destroyed or damaged, while the total plant roof area damage was 39 percent according to XXI BC figures of 22 Jan.

The latest JTG estimates of 2 Feb are that a minimum loss of from 3 to 5 months' output in the engine plant and from 2½ to 3 months' output in the assembly plant will result from this one mission. It is even possible that extensive trucking activity near the plant may indicate the abandonment of this site.

The latest XXI Bomber Command photo interpretation of 26 January places the physical damage to this plant at 36.1%.

On 10 Feb. JTG concludes that available photo cover shows the possibility of dispersal of the airframe sections and some repair in the engine section.

Photos from the XXI BC of 6 Feb. show about 12 percent, or 121,400 square feet, of damaged roof area to be repaired, but none of the damaged major buildings have been completely repaired and there is no evidence that the plant is as yet operational. Of the 47 A/C visible on the adjoining field, 35 have not been moved since 28 Jan. and are inferred to be incomplete or damaged.

Loss of production is estimated by JTG to be from 350 to 750 A/C and from 800 to 1080 engines.

Production loss of engines and a/c was considerably hiked by JTG's 2 March Economic D/A Report. In engines the loss is now put at from 1500 to 2000, and the a/c/ loss is raised to 985.

9 June: Returning to Akashi for the first time since 19 Jan., 24 B-29's of 26 airborne, dropped 149 tons of 4000 lb. HE's by radar. An area in the city 1000 to 2000 feet southeast of the target was heavily hit, but the Kawasaki plant received little additional damage. One building was gutted to the extent of 15,000 sq. feet.

22 June: 25 A/C visually dropped HE's on this target, with the result that the plant, which had been repaired since its early destruction, was again put out of commission. Photo reconnaissance shows that about 904,750 sq. feet of new damage was inflicted. This represents 26% of the total roof area.

MITSUBISHI AIRCRAFT PLANT - NAGOYA (194)

18 Dec.: 63 of 89 a/c airborne dropped 154 tons of bombs-- three squadrons bombing visually, six by radar--causing damage to 17 percent of entire roof area, quite extensive damage to the wing and fuselage section, material damage to the engine and power plant area, 35 percent roof damage to two large buildings in the assembly plant, and critical damage in the newly completed experimental area.

14 Jan.: 40 of 73 planes airborne dropped 94 tons of bombs principally by radar causing some additional damage to hangar and assembly type buildings in the southeastern portion of the plant as well as completely gutting the power plant.

XXI BC estimates on 22 Jan that the total <sup>temporary</sup> output interruption is around 60 percent.

JTG on 18 Jan considers that, although part of two sections of the plant may be abandoned as a result of the two raids, production loss will be from two weeks in the western Army section to three months for the southeastern Army section.

A photo interpretation on 10 February by AC/AS Intelligence places the structural damage at 10.3% and the superficial damage at 9.2% making a total of 19.5% physical damage to the plant to date.

JTG on 1 Feb. suggests an economic loss in production from 100 to 200 planes as a result of these two raids.

A-2 Photo Interpreters report that this plant suffered additional damage as a result of the 15 February attack against Mitsubishi Engine Plant and the 11 March incendiary raid on Nagoya. Damage, shown on 12 March photos, amounts to 1,648,000 sq. feet, or 29% of the plant roof area.

On 6 April, A-2 raises its estimate of area damaged, removed or abandoned to 32% of the original plant.

As a result of additional damage resulting from Mission 176, 17 May, this plant can be considered no longer a target. 71.5% of the total roof area has been damaged or destroyed.

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MITSUBISHI ENGINE PLANT - NAGOYA (1934)

13 Dec.: 71 of 90 planes airborne visually dropped 181 tons on this target causing considerable damage including: Two assembly buildings, 60 to 70 percent gutted; two main assembly buildings, 13.5 percent and 48 percent burned out; 22 other buildings destroyed or badly damaged, fire being the chief cause.

22 Dec.: 48 of 78 planes airborne dropped 130 tons by radar with unobserved results.

23 Jan.: 28 of 73 planes airborne bombed visually through 4 to 8/10 coverage with unobserved results.

Photos of 23 Jan show that repairs are in progress on damage of 13 Dec mission.

XXI Bomber Command estimates that nearly 75% of the plant can be considered non-productive until June 1945, with the remaining 25 percent, the eastern portion, affected only slightly.

Estimates of damage by JTG of February 2, however, are more conservative. Because the machining sections of the plant are the least seriously hurt, it is believed that immediate production loss will amount to one month's output of the standard lower-powered models--roughly 1400 engines.

A later report by JTG puts the production loss at approximately 2100 engines -- 1700 for the first mission and 400 for the ~~others~~ <sup>of 15 Feb.</sup>

15 Feb.: 33 of 117 A/C airborne dropped 104 tons of bombs visually with poor results on the primary target. Strike pictures show 8 direct hits on the westernmost main assembly building plus ten hits among miscellaneous buildings to the north and west of this assembly building.

25 Feb.: Because of 10/10 cloud coverage, none of the 150 A/C airborne bombed this target, most of them cropping 380 tons on Nagoya City by radar with unknown results.

From photos of 9 Mar the XXI BC assess the damage of 15 Feb attack at approximately 203,000 sq. ft., or 5.4% of plant roof area. However, most of the roof damage can be easily repaired, so the effect on production is thought to be small.

24/25 Mar.: 108 a/c of 111 airborne dropped 520 tons of bombs mostly by radar. This was a night attack employing essentially the same tactics used on the incendiary raids.

Actual new damage to this target amounts to about 173,500 sq. ft. or 4.5% of the total area. Additional damage was inflicted on the following plants:

Target 196 - Chigusa Factory, Nagoya Arsenal: 49 buildings (22 of Nagoya Pottery Works, reportedly converted to Arsenal) were destroyed, including 2 reported to be shell filling, 1 ballistics, and 12 storage for explosives or live ammunition.

Target 200 - Torimatsu Factory, Nagoya Arsenal: 129,000 sq.ft. or 11% of the total roof area, were destroyed or damaged.

Damage was also done to Kureha Textile Mills (a reported ammunition plant), while the Asashi Pottery works were completely destroyed.

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Nagoya City also received 8,000,000 sq. ft. of additional fire damage from this attack.

30 March: 12 a/c of 14 airborne, dropped 46 tons with results unobserved by the crews. This was a night attack, the a/c bombing individually from low altitudes

7 April: 158 of 194 a/c airborne dropped 672 tons of bombs visually from low altitudes, while in formation, with excellent results.

According to post strike photography of the XXI BC on 11 April, Mitsubishi Engine Plant can be considered no longer a target. As a result of the 7 April strike, plus the damage done in former attacks, it is estimated that 3,446,000 sq. ft. of roof area, representing 90% of the original plant roofage, has been destroyed or damaged. All major assembly buildings and machine shops are completely destroyed or severely damaged, and of a total of 140 buildings in the plant area, only 24 show no visible damage. These are all small buildings of 50,000 sq. ft. or less.

Later photography on 12 April revises the damage figure to 3,584,100 sq. feet, or 94% of the total roof area. XXI Bomber Command estimates that 63 of the large buildings, plus 27 smaller ones, were virtually destroyed.

JTG very tentatively places the economic loss at 1400 - 14 cylinder engines and 1000 - 18 cylinder engines. These figures will be revised upon further photography and study.

A-2 photo interpreters on 12 April estimate that the damage to the built-up area amounts to 3,229,900 sq. feet, or 82.5% of the entire plant.

A telecon from the XXI BC on 1 June states that as a result of additional damage suffered from 14 and 17 May incendiary attacks on Nagoya, the Mitsubishi A/C Assembly Plant can be considered no longer of target value. Damage, destruction and removal amounts to from 70% to 80% of the original roof area.

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MUSASHINO A/C PLANT - TOKYO (357)

24 Nov.: 24 of 111 A/C airborne dropped 57 tons of bombs visually with 13 hits in the target area causing only superficial damage.

3 Dec.: 59 of 86 A/C airborne dropped 142 tons visually with 4 bombs identifiable in the target area causing only slight blast damage.

27 Dec.: 72 A/C airborne dropped 98 tons of bombs visually. No report of further damage.

9 Jan.: 18 of 72 A/C airborne dropped 42 tons visually with only slight damage.

27 Jan.: All bombs were on the secondary target.

XXI BC on 21 Jan states that after 5 missions the total damage amounts to: 50 percent of two engine test cell buildings damaged and not yet repaired; one warehouse burned out; perhaps temporary delay in the production of the rod and supply buildings.

All other damage has been repaired and production presumably continues unimpaired.

JTG on 30 Jan considers the original target value of this factory unaffected by these attacks.

AC/AS, Intelligence, considered damage total to be about 2.6 percent of built up area as of 3 February 1945.

This plant was well hit by one task group of the Navy Carrier Strike Force against Japan on 16 February. Bombing was apparently excellent, according to the Navy report. No strike photos are available.

19 February: Target concealed, so all bombs dropped by radar on city of Tokyo.

Photos of 27 Feb. show 200,200 sq. ft. of roof area (11 percent of total) damaged, concentrations of hits being in the east half of the plant on machine shops and assembly storage buildings. This damage is evidently the result of the 16 Feb. strike by the Navy.

XXI BC on 2 March evaluates the total damage at about 270,000 sq. feet of roof area or 15% of the plant total. Included are three machining shops. A minor portion of this damage may be the result of the 25 February B-29 raid.

4 March: Because of 10/10 cloud coverage all 192 planes airborne bombed the secondary by radar - Tokyo.

2 April: 115 a/c of 124 airborne dropped 1009 tons with no new damage reported.

7 April: Of 111 airborne, 108 a/c dropped 520 tons of bombs on this target visually, using fighter escort for the first time. Strike photos certify to good bombing accuracy, with 36% of visible bursts within 1000 ft. of the AP. and about 40 hits on or among the main buildings. From post strike reconnaissance photographs, of poor quality because of smoke from a smoldering fire, some new damage is seen in east half of the plant. No damage can be observed in the west half.

12 April: Of 114 a/c airborne, 94 dropped 490 tons of bombs visually in a daylight formation raid from low altitudes. Fighter escort protected the formations.

Post strike photos on 13 April show that a great deal of damage has resulted from the last two strikes. The XXI Bomber Command estimates that of the total roof area in the eastern section (1,128,500 sq. feet) 1,075,500 sq. feet or 94% have been destroyed or damaged to date. The eastern section, with its three story concrete buildings, received much less damage - about 10%.

The total roof area of the entire plant originally amounted to 1,832,000 sq. feet. To date 62.6% of this area (1,146,500 sq. feet) is damaged or destroyed.

A-2 photo interpreters place the damage to the entire plant at 57.9 % of the building plan area, or 1,054,050 sq. feet. The date of the post strike photography from which this assessment was made was 13 April.

JTG assesses the economic loss from all strikes at approximately  $2\frac{1}{2}$  months' production, 2600 army and 1625 navy engines. Converted into airframes, this amounts to 1500 army and 950 navy aircraft. This is considered a conservative figure as the degree of dispersal prior to the last two raids is not known.

JTG summarizes that the Musashino section of the plant retains no target value. The target value of the Tama section, however, is considerable, though it is undoubtedly lower than it was originally and will decrease if the expected dispersal follows.

HITACHI: A/C PLANT (2009)

149,000 sq. ft. of plant area has been damaged or destroyed as a result of the Navy carrier strikes against Japan as shown by recon photos of 27 Feb.

A-2, in a limited damage interpretation of 12 March 1945, reports that the damage to this plant centered in ten buildings and amounted to 17% of the built up plant area.

JTG on 24 Mar, estimates that a loss of output for slightly more than 2 months will result from this attack.

24 April: 108 B-29's, of 131 airborne, dropped 501 tons of HE's visually with good results.

Post strike photography shows about 66% (765,000 sq. feet) damaged or destroyed. The engine assembly and engine parts manufacturing buildings and six administrative and office buildings were completely damaged.

1200 to 1600 engines, probably of low horsepower, will be lost from these raids, it is thought by JTG on 12 June. The plant has no future target value and is not likely to be repaired.

HITACHI  
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NAKAJIMA OGIKUBA A/C PLANT - TOKYO (356)

24 Nov. and/or 3 Dec.: Never a primary target, this plant received damage to ~~six~~ buildings ranging from 30 percent to total destruction, causing 9 percent structural damage and 3 percent superficial damage to the entire plant, largely from fire.

JTG on 11 Jan. points out that, as no loss in engine production results from this attack, this plant retains its original slight target value.

JTG on 22 February reports repair to 3 buildings and removal of two others. The 6 other buildings which were damaged are still unrepaired. Some clearing of ground in the vicinity of the plant, the placing of additional AA batteries, and the building repairing and readjusting suggests the possibility that this plant may become important producer of engines and engine parts in the event of serious damage to the Tama - Musashino Plant.

NAKAJIMA  
OGIKUBA

NAKAJIMA  
KOIZUMI

NAKAJIMA A/C - KOIZUMI (1545)

Photos of 27 Feb. show 423,500 sq. ft. of damage to 5 main assembly and sub-assembly buildings. This is presumably the result of the Navy carrier strike of 25 Feb.

Assessments of 2 March place the damage at 16.9% of the total roof area or 529,000 sq. ft.

25 small combustible structures had been partially or wholly removed prior to 9 February according to A-2 in an evident attempt to reduce the fire hazards in the plant. This amounts to approximately 450,000 sq. ft. of roof area.

JTG estimates on 30 Mar. that, although the physical damage was only 17% of the plant area, the economic loss can be considered severe since most damage was concentrated in the major production sections. Production loss is considered about 650 planes. However, it is still a good target since four-fifths of the plant is still intact.

4 April: 43 a/c dropped 275 tons on Koizumi in a low-level night attack, aided by 5 other B-29's carrying flares. 18 other Superforts dumped 130 tons on Tokyo as secondary target. Results were not observed.

Post Strike photography shows additional damage as a result of this strike to the extent of 392,000,000, or 10.5% of the total roof area. Among the 13 buildings receiving damage were the finishing building, a machine shop, and the warehouse for engine parts.

A-2 estimates that previous to the B-29 raid of 4 April the damaged area of this plant amounted to 829,900 sq. feet, or 29.5% of the entire plant.

As 18 small buildings were removed from the plant during the period 12 Feb. to 24 March, it is not possible to definitely determine the exact damage. However, the XXI BC estimates that from the 4 April B-29 attack about 353,600 sq. feet of damage resulted. This is 9.5% of the original plant roof area. This brings the total damage to date to 882,900 sq. feet or 23.8 of the original roof area.

Of the original 3,700,000 sq. feet of roof area, 1,064,000 sq. feet have been removed to date. This makes a total of 52% of the original roof area either damaged or removed.

A-2 photo interpreters in an estimate on 4 May place the damage at 1,108,100 sq. feet. This amounts to 49.5% of the built-up area.

SHIZUOKA A/C PLANT

4 April: 48 a/c dropped 198 tons of bombs plus 1166 flares in a low altitude night attack. Only a few fires were observed and they appeared to be to the east and south of the target.

12 April: 11 planes dropped 56 tons of bombs visually on this plant as a target of opportunity after finding the primary target cloud covered.

It is considered by XXI Bomber Command to be about 75% damaged, with the main building, which houses assembly and machinery operations, completely gutted. The damage totals approximately 820,500 sq. ft. A small portion of this damage is from the 4 April Strike.

Latest JTG information indicates that the target boundaries include only the NE building groups. Revised damage to date is 17% structural and 18% superficial, making a total of 35% of the entire plant either destroyed or damaged.

On 19 April, XXI Bomber Command reported that damage to the target proper amounted to 823,000 sq. feet of roof area. This is 86% of the main plant section or 48% of the entire installation which includes barracks buildings and miscellaneous smaller structures. It is interesting to note that the roof area of the main assembly building (634,000 sq. feet) has been 99.5% damaged or destroyed.

JTG tentatively places the economic loss at 500 - 18 cylinder engines, but further study and better photography may revise this figure greatly.

24 April: 8 B-29's bombed Shizuoka as a secondary target. Four small buildings on the western edge of the target were reported destroyed.

JTG concludes that this plant will not be rebuilt and that little target value remains.

NAKAJIMA OTA A/C ASSEMBLY PLANT - TOKYO (1544)

10 Feb.: 84 A/C of 116 airborne bombed this plant visually with 237 tons of bombs, with observed results good to excellent.

Strike photos show considerable roof damage with two main assembly buildings completely gutted, four others partially gutted, scattered hits on several smaller structures, while three or four large buildings in the SE portion of the plant are obscured by billowing smoke and apparently on fire.

The Navy reports that during the 16/17 February carrier force raid on Japan the Ota A/C Plant was effectively hit by one small strike. No D/A available to date.

From post strike pictures the XXI BC assesses the destruction or severe damage of the roof area to be 755,900 square feet, or 33.5% of the entire roof area. However, as the western portion of the plant was relatively unaffected, it is possible that it may be still operational or capable of operation in a short while.

JTG on 24 Feb. assesses the plane loss at approximately 890 A/C.

Concurring with the XXI Bomber Command's estimate, JTG places the structural damage at 12.7 percent and the superficial at 20.7 percent, making a total of 33.4 percent of entire building area of the plant destroyed or damaged. Photos taken prior to 9 Feb. show several buildings removed amounting to 79,000 sq. ft., plus 123,400 sq. ft. of roofing on two buildings.

As a result of the two strikes to date on Ota (B-29 on 10 Feb and Navy on 16/17 Feb) the XXI BC estimates that total damage or building removal amounts to 74.6% of the entire original plant. This is broken down to 870,100 sq. ft., or 38.4%, destroyed or removed, 724,050 sq. ft., or 32%, gutted, and 105,300 sq. ft., or 4.2%, damaged.

Production loss as of 1 March 1945 is estimated by JTG to be approximately 1400 aircraft.

Deducting the buildings removed prior to February 12 from the original built up area, it is found that the plant on that date amounted to 2,521,700 sq. feet. A-2 photo interpreters estimate on 30 March that 70.6% of this revised built up area (1,793,500 sq. feet) has been destroyed or damaged.

An O.S.S. report on a civilian PW ferry pilot states that these raids destroyed 800 engines. Production was completely stopped and no rebuilding was evident in March or April.

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TACHIKAWA A/C PLANT (792)

As a result of Navy strikes, this plant has been damaged to the extent of 136,500 sq. ft. according to photos of 27 Feb.

XXI BC estimates on 5 March 1945 that if prefabricated parts and sub-assemblies are shipped in, the plant may show only a slight drop in production even though about 5% of the total roof area has been destroyed or damaged. A-2 puts the damage at approximately 4.2% of the built up area as of 14 March 1945.

4 April: 60 B-29's dropped 522 tons with the aid of flares, while 47 more hit the secondary target, Kawasaki City. Results unknown.

New damage resulting from 4 April attack is assessed by XXI BC on 18 April to total 365,081 sq. feet, or 12.7%. To date the total damage amounts to 17.5% of the plant roof area, or 505,081 sq. feet.

30 April: Of the 106 B-29's which took off, only 7 bombed the primary visually through 5/10 to 10/10 clouds with results which were unobserved. Most of the remainder dropped by radar on the city of Hamamatsu.

TACHIKAWA

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TACHAIRAI ARMY AIRFIELD

27 March: 78 A/C dropped 268 tons of bombs on this target visually in a 3 way attack on Kyushu air depots.

8 of 9 hangars were damaged or destroyed in addition to numerous buildings in the shop area. 41 A/C were destroyed and 5 damaged.

A later evaluation of strike photos by XXI B.C. dated 29 Mar. places the buildings hit at 5 large hangars, 3 repair shops, 2 small barracks or office buildings, and several miscellaneous small shops and buildings. Numerous a/c were also destroyed or damaged. The roof area destroyed or damaged totals about 606,500 sq. ft.

31 March: In an attack on 3 Kyushu airfields and depots, B-29 a/c struck Tachiarai for the second time in 4 days.

As a result of both missions, the machine works, target 1870, is reported by XXI Bomber Command to be completely destroyed. 19 buildings of the Army Air Base are also seen to be destroyed on post strike photography of 12 April.

17 April: All 21 a/c which were airborne on this mission hit Tachiarai airfield in a daylight formation attack, dropping 81 tons visually with reported excellent results.

18 April: 21 of 22 a/c airborne dropped 76 tons of bombs visually with fair to excellent results reported by the crews.

21 April: 17 a/c bombed this target visually.

3 May: 9 a/c bombed visually.

5 May: 10 a/c bombed visually.

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OITA AIRFIELD

27 March: 35 A/C hit Oita with 122 tons visually.

Post strike photos of 29 March show damage to 4 hangars and 4 general type buildings, plus 3 buildings destroyed. 10 A/C were damaged.

A revised estimate on 1 April by XXI B.C. lists 1 hangar gutted, 2 hangers with severe roof damage, and 3 revetted buildings plus 5 miscellaneous buildings destroyed, all totalling 112,175 sq. ft.. In addition, 250,000 sq. ft. of residential area were destroyed.

21 April: 17 a/c bombed this target visually.

26 April: 19 a/c bombed by radar.

30 April: 10 a/c bombed visually.

4 May: 10 a/c bombed visually.

5 May: 16 a/c bombed visually.

7 May: 10 a/c bombed visually

8 May: 11 a/c bombed by radar.

11 May: 17 a/c bombed visually.

OITA

OMURA A/C FACTORY

27 March: 40 A/C dropped 180 tons on Omura visually.

From photography of 29 March, the XXI BC reports damage to two assembly buildings, 3 machine shops, and several miscellaneous buildings, most of which were in the engine part of the plant.

257,000 sq. ft. or 9.1% of the total original roof area, were damaged or destroyed by this attack.

Divided into 3 parts the total plant damage to date is as follows:

Part 1, Administration and Plant Maintenance

Previous Damage:	1500 sq. ft.	-	0.8%	of roof area damaged
New Damage:	12,600 sq.ft.	-	6.9%	of roof area damaged
Total Damage:	14,100 sq.ft.	-	7.7%	of roof area damaged

Part 2, Engine Repair

Old Damage:	79,000 sq. ft.	-	28.0%	of roof area damaged
New Damage:	137,470 sq.ft.	-	49.0%	" " " "
Total Damage:	216,470 sq.ft.	-	77.0%	" " " "

Part 3, Original a/c/ Engine Plant:

Old Damage:	206,800 sq.ft.	-	37%	of roof area damaged
New Damage:	106,650 sq.ft.	-	20%	of "roof area damaged
Total Damage:	313,450 sq.ft.	-	57%	of roof area damaged

31 March: In an attack against Kyushu airfields in cooperation with the Navy, the Omura Naval Air Station was hit with fair results. 97,945 additional sq. feet were damaged, bringing the total to 129,145 sq. feet or 13.7 of the built up part of the Naval Station.

Of the total built up area of the entire Omura installation, A-2 PI section estimates, on 17 April, that 43% or 1,674,500 sq. feet, has been destroyed or damaged.

4 May: 10 a/c bombed the airfield visually.

8 May: 1 a/c bombed Omura by radar as a target of opportunity with no results observed.

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HIRO NAVAL A/C FACTORY

5 May: Of 170 a/c airborne, 119 bombed visually and 25 by radar. Results from the 1000 and 2000 lb. GP's, dropped from formations, were reported from good to excellent and unobserved.

Post strike reconnaissance shows 400,000 sq. feet destroyed. Additional photos, however, show the damage to be 790,000 sq. feet, or 75% of the entire roof area. All major buildings are severely or completely damaged with the exception of one multi-storied concrete structure which has received three hits.

The Hiro Naval Engine and Turbine Factory also received extensive damage with photos showing about 80%, (870,000 sq. feet) damage to the roof area. The -SW portion of Hiro Arsenal was also damaged.

JIG estimates that July production will be lost for 3 or more months, flying boat repairs will be cut for 2-3 months, and possibly 100 engines may be lost. Only the engine shops still retains target value, and most of these functions may be dispersed elsewhere quickly.

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JAP AIRCRAFT AND ENGINE LOSS RESULTING FROM B-29 STRIKES

<u>Target</u>	<u>ENGINE LOSS</u>		<u>A/C LOSS</u>	
	<u>Estimate</u>	<u>Average</u>	<u>Estimate</u>	<u>Average</u>
Mitsubishi Engine		2100		
Mitsubishi A/C Assembly			100 - 200	150
Kawasaki A/C	800 - 1080	940	350 - 750	550
Musashino A/C	To date credited with no loss			
Ota A/C				890
Omura				125
Okayama		75		716 (trainers)
Mukden				120 "
		3115 Engines		2551 A/C

JTG figures are used.

As the destruction of engines and aircraft is partially, but not necessarily <sup>entirely</sup> redundant, adding the number of engines and planes does not give a completely true picture of production loss, but the effect on total plane production is much greater than the figure shown under A/C loss alone.

27 Feb 45

SECRET

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JAP A/C AND ENGINE LOSS RESULTING FROM B-29 STRIKES

FROM ATTACKS ON AIRFRAME PLANTS

	<u>ENGINE LOSS</u>	<u>A/C LOSS</u>
Kawasaki, Akashi		200
Mitsubishi, Nagoya		125
Nakajima, Ota		1000
Omura		125
Okayama, Formosa		700 (Trainers)
Mukden, Manchuria		<u>120</u> "

TOTAL 2270

FROM ATTACKS ON ENGINE PLANTS

Mitsubishi, Nagoya	2000	800
Kawasaki, Akashi	1500	700
Omura	<u>60</u>	<u>25</u>

TOTAL 3560 1525

Production Loss of A/C 3795  
Less Trainers 820

Production Loss of Combat A/C 2975

20 March 1945

JAP A/C AND ENGINE LOSS RESULTING FROM B-29 STRIKES

FROM ATTACKS ON AIRFRAME PLANTS

	<u>ENGINE LOSS</u>	<u>A/C LOSS</u>
Kawasaki, Akashi		200
Mitsubishi, Nagoya		125
Nakajima, Ota		1400
Nakajima, Kuizumi		650
Omura, Kyushu		125
Okayama, Formosa		700 (Trainers)
Mukden, Manchuria		<u>120 (Trainers)</u>
TOTAL		3320

FROM ATTACKS ON ENGINE PLANTS

Mitsubishi, Nagoya	2000	800
Kawasaki, Akashi	1500	700
Omura, Kyushu	60	25
Nakajima, Musashino	<u>2200</u>	<u>300/1000</u>
TOTAL	5760	1825/2525
Production Loss of A/C		5145/5845
Less Trainers		<u>820</u>
Production Loss of Combat A/C		4325/5025

NOTES:

Because of attacks on Nakajima airframe plants using engines produced by Musashino, a/c loss may be duplicated by attack on this plant, and the 300-1000 loss figure allows for the uncertainty of such duplication.

Results of the Navy carrier strikes are included in all estimates.

Figures revised to 1 March 1945.

9 April 1945.

KAWANISHI A/C - FUKAE PLANT - KOBE

11 May: 92 B-29's, of 102 airborne, dropped 465 tons visually and by radar from 16,750 feet to 18,500 feet with results unobserved.

Reconnaissance proves that considerable damage resulted from the 11 May attack with 500,000 sq. feet or 38% of total roof area, damaged or destroyed. Adjacent to the plant to the north and east is a burned out and destroyed area totaling about 1,800,000 sq. feet, including about 70% of a merchant marine college.

JTG evaluates most of this 40% damage as superficial rather than structural, and, therefore, considers the plant to retain a relatively high percentage of its original target value.

KAWANISHI A.C.  
FUKAE PLANT  
KOBE

AICHI A/C ENGINE WORKS - NAGOYA PLANT

As result of the incendiary attacks against Nagoya on 12 and 18 March, this plant shows severe damage to six buildings. 36,000 sq. feet or 7.8% of the built up area is definitely destroyed by fire. Of the original built-up area, 16.6% has been either removed, abandoned or damaged to date.

9 June: Of 44 a/c airborne, 38 bombed targets 198 and 2010 visually with 274 tons. This bomb load included some 4000 pounders, used for the first time against Japan. The results were most heartening.

Photo reconnaissance shows that the Nagoya Plant, target 2010, as well as the Atsuta Plant, No. 198, received heavy damage. No. 2010 is 52% destroyed with every major building affected. Roof area destroyed or damaged totals 264,000 sq. feet. 96% of target 198, or 1,145,000 sq. feet is destroyed or damaged, leaving only 2 buildings unaffected.

As a result of 9 June mission, the Sumitomo Light Metal Mfg. Co., target 2040, has 3 buildings, two large and one small, very heavily damaged.

AICHI A/C ENGINE  
NAGOYA PLANT

OKAMOTO A/C WORKS - NAGOYA

Damage amounting to 146,200 sq. feet can be seen in photography of 12 April as a result of incendiary raids on Nagoya prior to this date. 18 of 28 buildings were completely destroyed, while two more were almost completely burned out. This damage equalled 66.8% of the entire built up area.

OKAMOTO  
A/C  
NAGOYA

KAWANISHI A/C - NARUO PLANT

9 June: Bombing by radar and visual means, 44 B-29's of 46 airborne, struck this plant a severe blow with 261 tons of Hb's. Results were reported excellent.

XXI BC reports that from post strike photography it can be seen that this plant is almost completely destroyed. 1,642,200 sq. feet, or approximately 78% of the present total roof area has been destroyed or damaged. Previously, 317,800 sq. feet had been removed since March 17. 3 four-story, reinforced concrete buildings received 12 direct hits, internal damage being impossible to assess. The only other large building remaining, the a/c assembly building, is 25% damaged. One office building, four-story concrete, remains standing.

KAWANISHI  
A.C. NARUO



KASUMIGAURA SEAPLANE BASE

10 June: 74 a/c dropped 400 tons of HE's visually and by radar on this secondary target.

It is reported that the majority of the buildings in the area have been damaged or destroyed with intense fires observed 10 minutes after the first formation had dropped its bombs.

Post strike photos show that 33% of the target has been destroyed. 230,300 sq. feet of roof area were destroyed, and five additional buildings received minor roof damage.

KASUMIGAURA  
SEAPLANE BASE

1391 - JAPAN A/C CO. - TOMIOKA (ISHIKAWAJIMA)

10 June: 32 a/c of 33 airborne, dropped 171 tons of HE's by radar with no results observed.

JAPAN  
A/C

#1476 - HITACHI ENGINEERING WORKS - SUKEGAWA

10 June: 118 out of 124 a/c dropped 817 tons of HE's visually, reporting 85% of the target destroyed or damaged. Reinforced concrete buildings received at least 10 hits, internal damage is believed to be severe. All other major buildings are completely gutted or destroyed as well as many small houses 550 feet east of the target. Direct hits are also visible on the railroad east of the plant.

Post strike photography shows this plant virtually destroyed. Only 8 of 101 buildings show no damage. 2,062,604 sq. feet of roof area, representing 97.5% of the original roof area, are either destroyed or damaged.

#2145 - HITACHI A/C PLANT - CHIBA

10 June: 26 out of 27 a/c airborne dropped 140 tons of HE's  
by radar with unobserved results.

Reconnaissance proves that no damage was done by this raid.

#2008 - TACHIKAWA ARMY AIR ARSENAL

10 June: 29 a/c of 34 airborne dropped 163 tons on the Tachikawa Air Depot visually and by radar. The NE and SE corners are reported heavily hit.

TACHIKAWA  
ARSENAL

AICHI A/C CO., EITOKU PLANT (1729)

26 June: 50 A/C struck this plant with unobserved results.

It is determined from post strike that 113,800 sq. feet (4.3% of roof area) was damaged by this raid. Total damage is about 508,400 sq. feet or 19.3 of the original roof area.

KAWASAKI A/C KAGAMIGAHARA PLANT (240)

22 June: 18 A/C bombed with unobserved results.

26 June: 21 A/C dropped HE's on this plant visually with good results reported.

About 432,000 sq. feet of new damage, or 27% results from this mission. Previous damage brings the total to about 60% of the original roof area.

MITSUBISHI A/C KAGAMIGAHARA PLANT (1833)

22 June: 18 A/C bombed but results were not definitely determined.

25 June: 59 A/C dropped HE's on this plant with good results reported.

Post strike photography shows 167,000 sq. feet, or 20%, of this plant destroyed by this mission. However, incomplete coverage makes accurate assessment impossible.

The Kagamigahara Military Airport to the west of #1833 received 550,000 sq. feet of damage representing 50% of the total original roof area. 3 large saw-toothed buildings were among those damaged.



SUMITOMO KANSKI PROPELLER PLANT - AMAGASAKI

This plant was severely damaged as a result of a night incendiary raid 15 June against Osaka and Amagasaki. Damage to the target totals 1,032,200 sq. feet, representing 66.1% of the original roof area.

KANSKI  
-K-  
SUMITOMO

TOKYO INDUSTRIAL AREA

# 38 25 Feb.: In the largest raid to date, 167 A/C of 229 airborne, lost 501 tons of incendiary and GP bombs on the heart of the city, bombing by radar through a snow storm. This raid was in conjunction with the Navy carrier strike and E/A interception was nil.

A telecon of 28 Feb. from XXI BC states that post strike photos show 19 burned out areas totaling 29,074,000 sq. ft.

The Majority of this damage was in congested residential areas containing some small unidentified industry. The major portion located between the NE corner of the Palace and the West banks of the Sendai River.

# 40 9/10 March: Again breaking all records and attempting entirely new tactics, 332 a/c took off from the Marianas for a low altitude (5-11,000), individual a/c, night attack on the city. All planes homed in on specially equipped advance planes, and the target was lit up by pathfinders with M-47 IB's. Approximately 1700 tons of IB's were dropped on the primary target by 285 a/c, visually and by radar.

From post-strike photography, the XXI BC estimates on 11 March that a total of 461,150,000 sq. feet of the city has been destroyed or damaged, making an equivalent of 16.7 square miles. Practically all of Zone I, Tokyo's most inflammable section, was wiped out by raging fires that merged and crossed many wide fire breaks. Included in the listed targets which were either destroyed or severely damaged are the following:

- Rising Sun Petroleum Terminal
- Ogura Oil Company
- Nisshin Spinning Mill
- Hattori Company
- Oriental Weaving Co. Plants
- Koto Market
- Kanda Market
- Japan Machine Industry
- Nippon Oil Company
- Nisso Steel Manufacturing Co.
- Tokyo Gas, Sunamachi Branch
- Tokyo Tozai Company
- Rolling Stock Manufacturing Co.
- Fujikura Electric Cable Works
- Tsukiji Market and Warehouses

Other identified industrial installations destroyed or damaged are:

- Nakayama Steel Co. (Galvanized sheets and plates)
- Royal Celluloid Company
- Nisson Chemical Co. (Industrial chemicals)
- Japan Military Goods Co. (Components for automatic weapons)
- Japan Glycerine Company
- Daiao Textile Mill
- Japan Machinery Co. (A/C components)
- Kurihara Woolen Mill (Probably converted)

TOKYO

Shinohara Machinery Company (Machine tools)  
Asano Warehouses  
Senju Gas Works  
Oana Engineering Works (Machinery)  
Asakusa Telephone Exchange

A later assessment of the XXI BC, dated 20 March, raises the total damage visible in the city to 469,146,000 sq. ft., 10,800 acres or 16.8 sq. miles.

JTG estimates the gutted area (not simply burned over area) at 13.2 sq. miles. However, they concur in the XXI BC figure for the area burned over.

# 67 13/14 April: 348 B-29's took off from Mariana bases for a low level (5500 to 9900 feet), all incendiary, night attack. 303 a/c dropped 1876 tons by visual and radar methods through haze to 8/10 cloud coverage. Preliminary reports of results were very encouraging.

In spite of smoke from smoldering fires which still obscured part of the city at 0921, Tokyo time, extensive damage can be seen in the northwestern part of the city. Pending more adequate coverage, damage is set tentatively at 296,000,000 sq. ft. or 10.7 sq. miles. Seven numbered industries are damaged. Twenty numbered targets are within or adjacent to burned areas and may show damages in better photography.

Total visible damage in the city of Tokyo is now approximately 765,146,000 sq. ft. or 27.5 sq. miles.

#69 15 April: The southern incendiary zone was the target for 109 Superforts of 188 airborne. The a/c bombed individually by visual and radar means from 8300 feet to 9800 feet. Many large fires were reported near the aiming point as well as numerous explosions.

In spite of the poor quality of photography of 17 April, XXI BC reports that the damage and destruction in south Tokyo amounts to 144,680,000 sq. feet or 5.2 sq. miles. Included in, or adjacent to, this area are 18 listed industrial targets. The degree of damage to these installations can not as yet be determined, however.

As of 17 April 1945, the XXI BC reports that the total visible damage to Tokyo City amounts to 909,826,000 sq. feet, or 20,950 sq. acres, or 32.7 sq. miles. This is roughly equal to 40% of the city.

Huge fires were reported still burning in the Arsenal Area on 17 April, probably the result of the strike of 13/14 April.

It has been determined by XXI BC that the following industries were damaged by the last two raids on Tokyo and the one on Kawasaki:

Target 202	- Army central clothing depot (70PC coverage on 24 inch prints).
Target 203	- Ordnance Supply Depot (Inadequate coverage)
Target 204	- Japan Artificial Fertilizer Co.
Target 205	- Army Arsenal and Military Gunpowder Works (Itabashi Powder Plant)
Target 206	- Oji Army Arsenal
Target 207	Military Gunpowder Works
Target 208	- Army Branch Powder Factory.

- Target 209 - Military Works (Takinogawa Army Arsenal)
- Target 228 - Government Power Station
- Target 352 - Army Arsenal and Engineering School
- Target 1335 - Reported location of Naval Gunpowder Works
- Target 1364 - Physico-Chemical Industries Ltd.
- Target XXI 3004 - Unidentified industry.
- Target XXI 3062 - Unidentified industry.
- Target XXI 3006 - Target XXI 3007 - Unidentified industries adjacent to Sugamo Prison.
- Target 214 - Armory
- Target 224 - Tabata Nippori RR Yards.
- Target XXI 3109 - Unidentified arsenal
- Target 1419 - Navy Department Towers
- Target 363 - Radio Station JOAK
- Target 365 - Shiodome Freight Yards.
- Target 1448 - Tsukiji Market and Wholesale Warehouse
- Target 885 - Takeisha Pier
- Target XXI 3113 - Navy Technical Research Laboratory
- Target 327 - Mitsubishi Aircraft Co., Shibaura Plant.
- Target 881 - Hinode -Cho Pier.
- Target 889 - Factory No. 3 of Nippon Electric Co.
- Target 887 - Shibaura Wharf.
- Target 31 - Tokyo Gas and Electric Engineering.
- Target 919 - Tokyo Measuring Instrument Works
- Target 918 - Niigata Iron Works
- Target 541 - Oriental Otis Elevator
- Target 1332 - Rolling Stock Company
- Target 573 - Miyata Engineering Works
- Target 1362 - Kitashin Electric Engineering Company
- Target 1357 - Tokyo Special Machine Mfg. Co.
- Target XXI 3075 - Unidentified industry
- Target XXI 3058 - unidentified industry
- Target XXI 3070 - unidentified industry
- Target XXI 3069 - unidentified industry.
- Target 4011 - Electrical Instrument Plant.
- Target 58 - Tokyo Special Steel and Chrome Works.
- Target 487 - Meiji Sugar Factory
- Target 496 - Factory No. 1 of Tokyo-Shibaura Electric Co.
- Target 106 - Railroad Transformer Station
- Target 105 - Kaaasaki Substation No. 1
- Target 488 - Factory No. 2 of Tokyo Shibaura Electric Co.
- Target 489 - Nippon Electric Wire and Cable Co.
- Target 494 - Tokyo Electric Wire and Mft. Co.
- Target 485 - Fuji Spinning Mills.
- Target 484 - Showa Wire Cable Company
- Target 141 - Yokohama Rubber Co.
- Target 1399 - Hodogaya Soda
- Misshin Spinning Co. (No Target Number)

#181 23/24 May: Bombing Southern Tokyo at night visually and by radar, 514 out of 558 B-29's reached the target and dropped 3660 tons of incendiaries from 9 to 12,000 feet. Preliminary damage assessment is limited by poor photography, but 86,000,000 sq. feet can be distinguished, bringing the total damage in Tokyo to approximately 35.9 sq. miles or 995,826,000 sq. feet.

#183 25/26 May: 446 A/C, of 497 airborne, dropped 3141 tons of incendiaries by visual and radar methods in a midnight attack which took advantage of the disorder caused by the raid two nights before. The target area was south of the Palace Grounds, and strike pictures show excellent results.

Quite extensive damage is seen in post-strike coverage. However, it is impossible determine the definite proportion allocated to each of

the last two missions, although the major portion was caused by the latter. Damage from the two missions totals 18.6 sq. miles or 516,000,000 sq. feet. This new damage is seen primarily in the area lying south and west of the Palace, with numerous buildings inside the Palace Grounds destroyed.

The following industries show damage:

<u>Target No.</u>	<u>Name</u>	<u>Extent of Damage</u>
XXI 3709	Probably Powder Plant	50% of buildings destroyed.
2105	Kokusan Elec. Co., Toshima Plt.	40% of bldgs. destroyed
880	Konishi Photo Works	3 small bldgs. destroyed.
1574	Shinjuku St. & RR Junctions	1 warehouse gutted.
214	Armory	40 % of bldgs. destroyed.
352	Army Arsenal & Engineer School	20% of bldgs. destroyed
1419	Navy Dept. Towers	Destroyed.
1340	Harley-Davidson Motorcycle Co.	Destroyed.
367	Tokyo Central Station	Gutted
1424	Central Meteorological Observa- tory	Destroyed.
327	Mitsubishi A/C Co., Shibaura plant	80 % destroyed.
886	Hinode-Cho Pier	15% of bldgs. destroyed.
326	Nippon Elec. Co., Factory No. 2	1 small bldg. destroyed.
883	Ikegai Motor Plant	90% destroyed.
1345	Tokyo Municipality Steam Plant	1 wet Gasometer severely damaged. 1 wet Gasometer lightly damaged
889	Nippon Electric Co., Factory #3	70 % destroyed.
888	Oki Electric Co., Plant No. 1	50% destroyed.
1361	Kokusan Machinery Co.	Reported Location, destroyed.
XXI 3112	Ebisu Beer Co.	70% damaged or destroyed.
XXI 3113	Navy Technical Research Laboratory 1	1-975 ft. bldg. gutted.
1331	Kayaba Engineering Co.	4 small bldgs. destroyed.
887	Shibaura Wharf	29 small bldgs. destroyed.
2109	Shinagawa Mfg. Co.	Tokyo Plant, reported area - 30 % destroyed.
551	Medensha Electrical Equip. Co. Factory No. 1	25% destroyed.
1355	Japan Steel Bearing Co.	4 small bldgs destroyed
370	OI Railroad Works	4 small bldgs. destroyed.
799	Mitsubishi A/C Co., Oimachi Plt	20% destroyed
332	Nakajima Seaplane Works	Reported Location - 6 small bldgs destroyed.
331	Tokyo Gas & Electrical Engineering Co.	1 bldg. destroyed
336	Japan Special Steel Co.	3 small bldgs. destroyed
2110	Tanaka Instrument Mfg. Co.	Reported Location - 80% destroyed.

As of 28 May, the total damage is estimated by XXI BC as 51.3 sq. miles or 1,420,000,000 sq. feet. of the built up portion of the city, approximately 45% is now destroyed or damaged.

On 7 June the XXI BC completed a total evaluation of all damage to the city of Tokyo resulting from Missions 37, 38, 40, 67, 69, 181 and 183 run on 19 Feb, 25 Feb, 9 Mar, 13 Apr, 15 Apr, 24 May and 25/26 May respectively.

Total damage to date (7 June) is reported by XXI BC to be 56.3 sq. miles. Figuring the built-up area of Tokyo at 110.8 sq. miles,

it can be seen that 50.8% has been damaged or destroyed. 16.8 sq. miles (15.1% of the city) is attributed to Missions 37, 38 and 40; 11.4 sq. miles (10.3%) to Mission 67; 6 sq. miles (5.4%) to Mission 69; and 22.1 sq. miles (20%) to Missions 181 and 183.

Incendiary Zone I is 80.3% destroyed while Zone II is 57.3% gone. The destruction of the target urban areas is as follows:

UA/1, target 3600 - 5.36 sq. miles or 39.5 percent.  
UA/2, target 3601 - 7.10 sq. miles or 47.6 percent.  
UA/3, target 3602 - 2.70 sq. miles or 41.5 percent.  
UA/4, target 3603 - 2.29 sq. miles or 43.5 percent.

Industrial targets which were damaged or destroyed by Missions 67 (13 April), 181 (24 May), and 183 (25/26 May) are attached.

In a D/A Report of 4 June, JTG places the damage to Tokyo UIC #1, target 3600, at 97,776,000 sq. feet. Of this total 90.1% represented buildings, 8.6% industrial establishments, and 1.3% mixed. From 160,000 to 180,000 dwellings were burned, dehousing from 575,000 to 625,000 persons.

KOBE INDUSTRIAL AREA

4 Feb.: 69 A.C of 110 airborne, loosed 173 tons of IB's predominately by radar, causing small fires in a congested industrial area.

XXI BC assesses damage to cover a total area of approximately 2,651,000 square feet with the Kanagafuchi Soda Industry 49 percent and the Mitsubishi Heavy Industries Ltd. 2 percent destroyed. 22,000 square feet of the Kawasaki Locomotive and Car Co. and 1,741,000 sq. ft. of surrounding small business and residential area are burned out. The date of this assessment is 7 February.

On 22 Feb. a P.I. report from A-2 estimates the structural damage to the Kanagafuchi Soda Plant to be approximately 61.1 percent.

A Spot D/A Report of 26 Feb. by JTG estimates that 55 percent of production of the Mitsubishi Heavy Industries, manufacturing electric motors, transformers, and generators, will be lost for a period of three months. 247,525 sq. ft. of the plant were damaged.

Kanagafuchi Soda Co., believed to be textile manufacturers, had damage to 528,300 sq. ft. of the plant, and is thought to be out of production completely for three months, and 50 percent out of production for an additional three months.

There is negligible damage to Kawasaki Locomotive and Car, while damage and destruction to miscellaneous warehouses, offices, small unidentified plants and housing sections bring the total area to 2,493,725 sq. ft.

16/17 Mar: 310 a/c of 334 airborne dropped 2328 tons of incendiary bombs visually and by radar, bombing from low altitudes, individually at night.

Damage, assessed by XXI B.C. from post strike photos of 18 and 24 Mar, amounts to 85,458,000 sq.ft. (3.0 sq. miles), or 21.4% of the entire city.

Among the plants damaged are Mitsubishi Heavy Industries, Ltd, Kawasaki Heavy Industries, Ltd, and the Arata Shipyards and Engine Wks.

In a preliminary damage assessment report on 18 April, JTG concludes that 90.3% of the 82,958,000 sq. feet of damage occurred to housing facilities; 6.1% of manufacturing establishments; 3.2% to storage space; .4% to transportation.

Damage was concentrated in the central part of the city, and commercial activity was seriously affected. As a result of the burning of approximately 50,000 houses, 250,000 persons were dehoued. Several large factories received damage, but JTG considers that the greatest industrial loss does not arise from this. Loss caused by damage to small component suppliers, diversion of labor, materials, and facilities to essential repair, redirection of disemployed labor, and absenteeism will greatly outweigh the actual large-industry physical destruction.

K  
O  
B  
E

5 June: Following up the daylight raid of June 1st on Osaka, 468 B-29's of 526 airborne, bombed Kobe. 2779 tons of incendiaries were loosed by radar and visual means during early daylight from around 15,000 feet.

Strike pictures show fires throughout the target area though half of the city, nearest the mountains, is smoke obscured. Fires are also visible NE of Kobe near target 1702, the Kawanishi A/C Co., Fukae Plant. Fires are visible in 17 numbered targets.

The XXI BC reports that post strike coverage of Kobe shows about 3.8 sq. miles of city area destroyed from this raid plus 0.5 sq. miles to the east of the city proper.

The following targets show damage from 5 June mission:

<u>Target No.</u>	<u>Name</u>	<u>Damage</u>
5	Kobe Steel Works	Small ship bldgs destroyed
6	Kobe Steel Works	Several small bldgs destroyed
11	Kawasaki Locomotive & Car Co.	5 large bldgs gutted
17	Rising Sun Petroleum Oil Storage	5% new damage
538	I.C.R. Shops	30% destroyed
1719	Nippon Airbrake Co.	60% destroyed
1745	Kawanishi Machine Shop	10% new damage
1762	Kawasaki Heavy Industry	50% new damage
7768	Kobe Steel Works	4 small bldgs. destroyed

Altogether about 8 sq. miles, or 51%, of the city has been damaged by fire. (The total area is 16.8 sq. miles, minus 1.1 sq. miles of sparsely built-up area, leaving 15.7 sq. miles on which to base calculations.)



OSAKA URBAN AREA

13/14 March: In the third large-scale night incendiary attack against Japanese industrial areas, 280 B-29's of 301 airborne, loosed approximately 2200 tons of IB's by radar and visual methods. The planes bombed individually from low altitudes.

Damage assessment reports from XXI BC on 22 March estimate the damage to the city to be approximately 226,010,000 sq. ft. or 8.1 sq. miles. Most of this is concentrated in one area sw of the castle 59% of incendiary Zone #1 was destroyed.

Many small unidentified industries were destroyed or damaged as well as the following listed targets:

- |             |                                 |
|-------------|---------------------------------|
| Target 1778 | Kubota Iron and Machinery Works |
| Target 1616 | Kujo Power Plant                |
| Target 1712 | Osaka Gas Co., Coke Oven Plant  |
| Target 1755 | Nakayama Steel Mfg. Co.         |
| Target 1761 | Mitta Leather Belt Co.          |
| Target 685  | Kurimoto Iron Works             |
| Target 686  | Osaka Metal Industry Co.        |
| Target 688  | Kubota Iron Mach. Works         |

In a damage assessment report of 9 April, JTG places the damage or destruction to actual ground area at 185,213,000 sq. ft. or 6.6 sq. miles. The difference in this figure and that of XXI Bomber Command is explained by the fact that JTG does not include streets, canals, and buildings left standing.

On 17 April JTG issued a full preliminary damage assessment report. The 185 million square feet of ground area damage (85,847,000 sq. feet of roof area) can be broken down into: 170,256,000 sq. feet (90,103,000 roof area) of residential, commercial, governmental buildings and household industry; 7,151,000 sq. feet (2,259,000 roof area) of manufacturing; 3,230,000 sq. feet (1,516,000 roof area) of storage; 4,576,000 sq. feet (1,969,000 roof area) of mixed residential and manufacturing. Between 115,000 and 130,000 houses were destroyed, dehousing 600,000 people. It is estimated that some 2000 small factories were within the burned area. Damage to important identified industrial plants was limited, however, with the exception of the Osaka Metal Industry which was totally destroyed. This plant forged and machined 75 mm shell cases--about 1.2% of total Jap output.

JTG estimates that the industrial damage resulting from this attack may not have an appreciable immediate effect on the production of military-end products. The impact of this loss can be cushioned by working inventories and pipe-line stocks of items produced in most of these small plants. It is also the opinion of JTG that the destruction of the heavily industrialized sections of Osaka, lying outside the burned out area, would have much greater effect on Jap war potential than the destruction of the center of the city. It is concluded that these areas should be attacked as soon as possible.

OSAKA URBAN AREA

The future target value of the heavily damaged areas in considered very small, the only sections in which worthwhile generalized industrial loss might be inflicted are southwest and northeast Kobe. Other areas would require precision attack.

1 June: For the second time Osaka received massed B-29 attention, this time from altitudes of 17,000 feet to 20,000 feet at around 1000 Of 509 planes airborne, 457 hit the target, dropping visually and by radar 2779 tons of M-47, E-46, M-26 and M-17 bombs.

The total damage from this mission, as seen from 6" vertical post-strike photography, amounts to 3.43 sq miles. This is located in several large patches around the former damage. Industrial targets showing damage are:

<u>Target No.</u>	<u>Name</u>
53	Osaka Harbor
1726	Osaka Ceramic Industry Cement Co.
264	Sumitomo Metal Industry
5008	Probably part of target No. 263, Unidentified industry
1734	Japan Dyestuff Mfg. Co. (Drugs)
5009	Unidentified industry
548	Rolling Stock Mfg. Co.
5010	Unidentified industry
1733	Japan Dyestuff Mfg. (Dye Plant)
2030	Osaka Chain & Machinery Works
699	Osaka Iron Works. Unit No. 2

Total damage in Osaka on 4 June is estimated by the XXI BC to total 11.53 sq. miles, representing 18.7 percent of the built up portion of the city. (Area of Osaka is about 76.1 sq. miles minus 14.3 sq. miles of sparsely populated areas, leaving 61.8 sq. miles.)

7 June: Of the 449 B-29's taking off for Osaka, 409 dropped 2649 tons of IB's primarily by radar. The arsenal and northeast part of Osaka were the target.

Complete post strike coverage shows about 3.4 sq. miles destroyed from this latest raid, located mostly north and northeast of the Castle. In the Castle area, 12 barracks type and 2 miscellaneous buildings are destroyed. So far as can be seen, no numbered targets received additional damage.

24% or 14.65 sq. miles of Osaka is now damaged or destroyed. (Total area of Osaka is figured at 74.8 sq. miles minus 14.2 sparsely built-up area, or 60.6 sq. miles.)

A later assessment of this mission shows the damage to be only 2.21 sq. miles, bringing the total to 13.46 sq. miles or 22.5% of the built up portion of the city. The Sumitomo Metal Industry, target 263 D, was 30% destroyed; Matsudoki Engine Works, target 1191, about 50% destroyed; seven large, seven small buildings destroyed and other received fire damage in #1746, the Oki Electric Co.; target 1786, Oriental Can Co. was 90% destroyed.

15 June: 444 A/C, of 512 airborne, struck Osaka and Amagasaki, dropping 3140 tons of IB's by radar at night.

The city of Osaka received damage equivalent to 2.13 sq. miles, located primarily in the east and north section. The Osaka Arsenal, (382), Mitsubishi Copper Refinery (697), Osaka RR Station (1206), and the Fusukowa Electric Co. (1740) received damage.

The damage to date (20 June) amounts to 15.59 sq. miles, or about 26% of the built up area of the city.

NAGOYA URBAN AREA

3 Jan.: 57 A/C, of 97 airborne, scattered 150 tons of incendiary bombs with indifferent results.

Photo intelligence states that the damaged area was 3,115,650 square feet while the actual building damage was 1,369,925.

JTG on 29 Jan estimated the damage to be almost negligible, between 5 and 8,000 persons deoused, and the value of this urban area for future attacks unimpaired.

From further post strike cover, photo interpreters of AC/AS, Intelligence have discovered the actual building damage to be 1,813,867 square feet, with the total damage area amounting to 4,087,034 square feet. This interpretation was dated 14 February.

11/12 March: Continuing the fire attack on Japan started 48 hours before, 291 of 313 airborne a/c dropped around 2000 tons of IB visually and by radar at night from low altitudes, each plane bombing individually.

The XXI Bomber Command estimates on 14 March that 1.56 sq. mi. or 47,600,000 sq. ft. was burned over. The fires were scattered and did not merge as well as those in Tokyo, but the damage done was considerable.

Aidu A/C Works, Eitoku Plant, was damaged to the extent of 13.6% of the total roof area. Some damage was also inflicted on Atsuta Factory of Nagoya Arsenal, Daido Electric Steel, Nissan Chemical Plant, Hokoku Machinery Co., Sumitomo Light Metals Plant, and Nagoya Harbor Facilities. Numerous small unidentified industries were also in the burned areas.

18/19 March: Returning to Nagoya for the fifth all-incendiary attack in 10 days, 313 B-29's took off for a night, low altitude strike, 293 dropping 1858 tons by radar and visual methods.

The fires started by this attack were not stopped by fire breaks or former burned-out areas until about 82,000,000 sq. ft. or 2.95 sq. miles were devastated. 5 known industries received various degrees of damage as well as many unknown small plants.

The area damage in Nagoya City from all strikes to date totals 139,800,000 sq. ft. (5 square miles) as reported by XXI Bomber Command on 26 March, amounting to about 11.6% of the total city area. 57.5% of incendiary Zone #1 is included.

In a physical damage assessment, dated 24 April, A-2 photo interpreters place the damage or destruction at 123,468 sq. feet. This leaves out all streets, canals, fire breaks, etc., accounting for differences in XXI Bomber Command and JTG figures. This burned out area can be broken down further into:

Residential	- 102,345,000 sq. feet
Manufacturing	- 9,450,000 sq. feet
Mixed industrial/residential	- 10,362,000 sq. feet
Storage	- 1,290,000 sq. feet
Transportation	- 20,000 sq. feet

NAGOYA URBAN AREA

It is seen from post strike photography that the Nagoya Freight Yard has approximately 50% of its total loading space and buildings destroyed or damaged. 50% of the roof area of the Togo Cotton Mill (reported as Sumitomo Electric Mfg. Co.) was destroyed. 11 buildings, totaling 229,500 sq. feet, of the Atsuda Factory, Nagoya Arsenal, were destroyed or gutted.

The Aichi Aircraft Works, Nagoya Plant, had 6 buildings, totaling 36,400 sq. feet of roof area, destroyed. The Yamada Engineering Works was 90% destroyed, accounting for 36,400 sq. feet of roof area.

14 May: In the largest B-29 raid in history, 524 a/c took off to bomb the north and northwest portions of Nagoya in a daylight formation all-incendiary attack. 478 a/c reached the primary and bombed from 17,000 to 18,500 feet by radar and visual methods through 0.10 to 4/10 cloud coverage.

17 May: Following the daylight raid on Nagoya, another large incendiary attack was scheduled. This time 516 B-29's took off with 459 hitting the primary in a night attack. 3598 tons of incendiaries were loosed by radar and visual methods.

Photo coverage of 18 May shows 5.9 square miles (164,000,000 sq. feet) of damage resulting from the two raids (2.8 sq. miles 14 May and 3.1 sq. miles 17 May). Most of this additional damage was located to the north of the Castle, to the immediate west of the Hori River and to the east of the damage previously reported along the Hori River.

The total damage visible to date is about 11.3 sq. miles, or 315,000,000 sq. feet, representing about 22 percent of the entire city area.

Additional industries showing damage from missions 174 and 176 are the following:

- Target 194 Mitsubishi A/C Works - 10 percent new damage.
- Target 193 Mitsubishi A/C Engine Plant - 4 small buildings in the sw corner destroyed.
- Target 197 Atsuta factory of Nagoya Arsenal - Minor damage.
- Target 199 Aichi A/C works, Mizuho Branch - Practically destroyed.
- Target 247C Daido Electric Steel, Touhija Plant - Damaged.
- Target 250B Nagoya Repair Shops - Several small buildings destroyed.
- Target 1146 Okuma Iron Works - Hagina Plant - Severe Damage.
- Target 1729 Aichi A/C Works, Eitoku Plant - Several small buildings destroyed.
- Target 1798 Osaka Machinery Works - Destroyed.
- Target 1821 Riken Alunite Plant - Severe Damage.
- Target 1827 Dai Nippon Cellophane Plant - about 30% destroyed.
- Target 1829 Yahagi Steel Plant - about 25 percent destroyed.
- Target 1828 Aichi A/C Works, Tsukiji Plant - Several small buildings destroyed.
- Target 2040 Sumitomo Light Metals Co. - About 12 small buildings destroyed.
- Target XXI BC 4058 Unidentified shipyard - slight damage.
- Target XXI BC 4059 Unidentified - slight damage
- Target XXI BC 4067 Sumitomo Light Metals Co. - About 30% destroyed.

KUMAMOTO AIRCRAFT COMPANY

The Navy reported that this plant was 90 percent destroyed or damaged in its carrier based plane attack of 13/14 May.

A study of photos shows the plant apparently not in production, in bad disrepair, and abandoned.

23 bomb hits destroyed or damaged 20% of the roof area with most damage in the main shop area. Much of the roof appears to be falling away, and two buildings are not finished or are being removed.

0-103335X  
G/A

19  
15 February 1945

HAMAMATSU CITY

As a result of the 15 February raid on Nagoya, at which time Hamamatsu was a target of opportunity, a burned out area of approximately 2,000,000 sq. ft. shows up in photos of 18 February. This area lies east of the Tokaido Main Line RR, extending about 600 ft. on either side of a canal leading from the Imperial Hat Co. to a gas works.

Hamamatsu Airfield also shows slight hangar roof damage as well as other bomb craters in the hangar area.

Complete coverage of the city on 10 May shows damage amounting to 5,300,000 sq. feet or .19 of a square mile. This is the result of several raids in which the city was a secondary target, struck mostly by radar.

30 April: 76 a/c, of 106 airborne, dropped 500 lb. GP's on Hamamatsu as the radar target, only 7 hitting the primary visually.

19 May: Of 309 A/C airborne, 271 dropped 1485 tons of HE bombs by radar. Hamamatsu was the alternative if the Tachikawa A/C area was not visible. Total damage, scattered throughout the city, amounted to 6,200,000 sq. feet or .22 sq. mile. Included in this damage is the Suzuki Loom Works, Target 1227, which is now approximately 25 percent destroyed.

Total damage to the city is estimated by the XXI BC to be 15,015,000 sq. feet or .53 sq. mile. This is equal to about 12.1 percent of the entire city.

17/18 June: 130 B-29's dropped IB's on this urban area visually and by radar with excellent results reported.

XXI BC reports that reconnaissance photos show about 1.28 sq. miles of the central and western portion of the city destroyed. This amounts to over 30% of the built up area. Japan Musical Instrument Company shows damage of 195,000 sq. feet or 35% of the original roof area. This is one of Japan's three important propeller plants. Also, 60 % destroyed was the Imperial Government RR Shops, target 1219.

D/A Report of 29 June by XXI BC increases the total damage to the city to 2.76 sq. miles or 70% of the built-up area of the city. The majority of this damage was the result of the 17/18 June mission.

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KAGOSHIMA CITY

8 April: Hit as a secondary target only, Kagoshima is estimated by XXI Bomber Command to have suffered 1,260,000 sq. ft. of destruction in its center.

18 June: 117 A/C dropped IB's by radar and visually in a night raid. 2 sq. miles of damage resulted, bringing the total damage to date to 2.45 sq. miles or 50% of the built up portion of the city.

A later assessment of the XXI BC places the total damage at 2.15 sq. miles or 44.1% of the built up portion of the city. The Kagoshima RR Repair Shops (target 1517) received 10% damage and the Satsuma Spinning Mill was 75% destroyed.

23-520007  
C-1-74

KAWASAKI URBAN AREA

15 April: 196 of 219 a/c airborne dropped incendiary bombs on this target by visual and radar means at night from altitudes of 7000 to 10000 feet. Results were from unobserved to excellent. Fires merging into a huge conflagration, visible for 100 miles at sea, were reported by returning crews.

The actual damage estimated by XXI BC on 17 April, approximates 2.9 square miles or 80,920,000 sq. feet in the heart of the city. As only 6" oblique coverage was possible, this assessment of damage is merely tentative.

65% of Incendiary Zone #1 was destroyed, UA/1, target 3604 is 55%, UA/2, target 3605, is .05%, and UA/e, target 3606, is 30% destroyed.

Industrial targets receiving damage are as follows:

XXI 3070 - Unidentified Industry - 80% of plant destroyed or gutted.  
58 - Tokyo Special Steel & Chrome Works - 50% destroyed.  
105 - Kawasaki Substation No. 1 - Probably 30% of plant destroyed,  
106 - Railroad Transformer Station - 80% destroyed, the remaining buildings are probably severely damaged.  
141 - Yokohama Rubber Co. - at least 40% of plant destroyed  
484 - Showa Wire Cable Co. - 40% destroyed.  
485 - Fuji Spinning Mills - 80% gutted or destroyed.  
487 - Meiji Sugar Factory - 30% destroyed.  
488 - Factory No. 2 of Tokyo-Shibaura Electric Co. - 10% damaged  
489 - Nippon Electric Wire and Cable Co. - 30% of plant gutted.  
494 - Tokyo Electric Wire and Mfg. Co. - 100% destroyed.  
496 - Factory No. 1 of Tokyo-Shibaura Electric Co. - 25% of plant destroyed.  
4011 - Electrical Instrument Plant - 70% destroyed or gutted.

99.4%, or .7 sq. miles, of Incendiary Zone #I was destroyed, as well as 4.8 sq. miles or 65.2% of Zone II. UA/1, target 3607, has only 3.3% or .15 sq. miles destroyed, but UA/2, target 3608, is 56% burned out with 1.68 sq. miles of damage.

KAWASAKI  
URBAN AREA



YOKOHAMA URBAN AREA

29 May: Of the 510 B-29's which took off for a daylight mission, 459 dropped 2721 tons of IB's visually and by radar.

It can be seen from excellent post strike pictures that this raid was quite successful with 6.9 sq. miles (190,000,000 sq. feet) completely destroyed.

The industries which show damage are:

<u>Target No.</u>	<u>Name</u>	<u>Extent of Damage</u>	<u>% Destruction from later Assessment</u>
62	Hadogaya Sub-Station	95 percent of buildings destroyed	95 90
63	Kanagawa Steam Power Plant	30% of bldgs. destroyed.	98
66	Fukushima Freight Yard	1 whse destroyed and 2 damaged.	80
67ST	Station Junction Overpass	Several bldgs. destroyed	25
71	Uraga Dockyard No. 3	75% of bldgs. destroyed	90
499	Nippon Carbon Co., Fcty 1	90% of bldgs destroyed	90
1338	Inflammable Stge Locks	4 bldgs. destroyed, 5% of plant	05
1339	Ammunition Storage	35% of bldgs. destroyed	
1346	Yokohama Electric Light Co. Power Plant	80% of bldgs. destroyed	80
1399	Hadogaya Soda	80% of bldgs. destroyed Old damage & 10% of bldgs destroyed - New damage	20
1432	Yokohama Harbor Passenger Wharves	15% of bldgs destroyed	15
1438	Kyoritsu Warehouse	90 % of bldgs. destroyed	90
1442	Yokohama Warehouse	95% of bldgs destroyed	100
1443	National Silk Conditioning House	15% of bldgs destroyed	10
1445	Yokohama Harbor Cooperative Purchasing Co. Warehouses	15% of bldgs destroyed	
1446	East Asia Development Co. Whse.	85% affected.	85
1451	Naniwa Warehouse	20% of bldgs destroyed. Still Smoldering.	04
1493	Toshin and Shinko Whses.	60% of bldgs destroyed	80
XX13054	Unidentified Industry	20% of bldgs destroyed	04

Added to previous damage the total now stands at 8.9 sq. miles or 44% of the entire built-up area. This is practically the entire southern half of the city. (Of the 28 sq. miles in the city proper, 17.8 are very sparsely populated, leaving a target area of 20.2 sq. miles.)

~~99.4%, or .7 sq. miles, of Incendiary Zone #1 was destroyed as well as 4.8 sq. miles, or 65.2% of Zone II. UA/1, target 3607, has only 3.3% or .15 sq. miles destroyed, but UA/2, target 3608 is 56% burned out with 1.68 sq. miles of damage.~~

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UBE URBAN AREA

1/2 July: 100 B-29's hit this target in a night all-incendiary attack.

.42 sq. miles or 23% of the built up portion of the city were destroyed.

OMUTA URBAN AREA

11/18 June: 116 B-29's struck this target with IB's in a night raid, using visual and radar methods of bombing.

Post strike coverage shows about .11 sq. mile, or 2.5% of the entire built up area, destroyed by fire.

OMUTA

KOCHI URBAN AREA

4 July: 126 a/c bombed visually and by radar in a night incendiary attack on Kochi.

Post strike coverage shows .92 sq. mile of damage representing 48% of the built up portion of the city.

KOCHI

FUKUOKA URBAN AREA

19 June: 222 a/c bombed Fukuoka in an all incendiary, night attack by visual and radar methods.

About 1.3 sq. miles, or 20% of the 6.5 sq. miles of total built up area, were destroyed by this mission.

A later XXI BC assessment places the damage at 1.37 sq. miles, representing 21.5% of the city's built up area. Target 1255, Hakata Harbor, has 30% of its buildings destroyed. The Hakata RR Station and Yards, target 1270, contains minor damage.

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Sumitomo Duralumin Co. (2040)

26 June: 27 a/c, dropping HE's visually, added 492,200 sq. feet  
(25% of roof are) of damage, making a total of 1,280,970 sq. feet  
(52.5%) of damage to date.

DURALUMIN  
SUMITOMO

UTSUBE RIVER OIL REFINERY (1684)

The damage inflicted on this plant on 22 June, when it was a secondary target, is not definitely determined, although there were some direct hits.

26 June: 33 stripped B-29's of the 315th Wing dropped 223 tons of HE's by radar.

30% of the roof area (538,330 sq. feet) was destroyed or damaged by the two missions. Hydrogenation units, the reported tetraethyl lead unit, possible oil drum manufacturing unit, the probably by-products processing unit, and an unidentified unit relating to the refinery all received damage. Ten small by-products tanks and one large crude oil storage tank were destroyed, with less damage to several other units.

U-1  
1684

SUMITOMO METAL INDUSTRY AND ALUMINUM  
CO. \* OSAKA PLANT \* No. 263A

26 June: 64 planes hit this target with HE's visually and by radar, resulting in about 12% destruction of the entire roof area. This amounts to 250,000 sq. feet of damage.

OSAKA  
536-1060



MARUZEN OIL REFINERY

2/3 July: 39 of the 40 a/c airborne dropped 279 tons of HE's on this target at night using direct synchronous radar bombing technique. This was the third mission of the 315th Wing.

Pictures taken on the 4 July show fires still burning in two crude oil tanks in the south end of the plant. One unit in the refining area is severely damaged. In the north portion, across the river, there is some damage visible also.

6 July: 58 a/c revisited this target, dropping 500 lb. GP's by radar at night.

A telecon from XXI BC on 11 July states that 95% of the target has been destroyed. Only 5 large tanks, several small tanks, and 2 buildings are left undamaged.

0-1  
MARUZEN

AMAGASAKI URBAN AREA

15 June: 444 of the 512 B-29's airborne dropped 3140 tons of IB's on this city and Osaka in a night attack by radar.

Approximately 0.58 sq. miles of the eastern port of the city were destroyed by fire, raising the total to 0.75 sq. miles, or about 11% of the built up area.

The Sumitomo Kanzaki (Propeller) Plant was reported to be 90% destroyed. The damage was later reduced to about 66%, but even so, the plant can be considered out of production for a long time.

Target 793 - Fukuda Light Airplane Co. is 50% destroyed.  
Target 5006 - Unidentified industry is 40% destroyed.  
Target 1634 - Miraguchi Gear Works is 10% destroyed.  
Target 5020 - Muslin Mill is 5% destroyed.

AMAGASAKI

Shizuoka Urban Area

19 June: 123 A/C bombed this city in a night all-incendiary raid visually and by radar.

The results were very good with 66% (2.25 sq. miles) of the city burned out. The only numbered target damaged was the Sumitomo Light Metals Company with 76% of its roof area destroyed. Five other unnumbered targets received some damage.

SHIZUOKA

YOKKAICHI URBAN AREA

17/18 June: 89 B-29's dropped incendiaries visually and by radar in a night attack, with excellent results reported.

Complete post strike cover shows the main urban area destroyed. The damage totals 1.23 sq. miles, which, excluding the industrial areas, equals 59% of the built up portion of the city. Of the Total built up area of 3.51 sq. miles, 35% has been burned over. Most of the target along the waterfront received some damage.

The following targets show damage:

- 1684 - Utsube River Oil Refinery - 0.5% damaged.
- 1685 - Mitaki River Oil Refinery - 15% damaged.
- 1773 - Yokkaichi Harbor Facilities - 20 percent destroyed.
- 1776 - Ishara Smelter & Refinery - 5% damaged.
- 4052 - Unidentified Industry - 95% destroyed.
- 4053 - Unidentified Slipway - 20% destroyed.
- 4054 - Unidentified Industry - 25% destroyed.

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TOYOHASHI URBAN AREA

19 June: 136 B-29's hit this target by night, dropping IB's by radar and visual means.

1.7 sq. miles of damage resulted from this mission, equalling 52% of the built up portion of the city. Part of the city, however, is cloud covered and the total damage can not be accurately determined. The Toyohashi Army Base and Arsenal received some damage.

TOYOHASHI

MOJI URBAN AREA

28/29 June: 91 A/C bombed Moji at night by radar and visually with IB bombs.

Although partially obscured by smoke from fires in Shimonoseki, damage of .32 sq. miles can be seen, amounting to 28.8% of the built up portion of the city. The total industrial area of .213 sq. miles has 49.3% or .1 sq. miles damaged. Targets 44A, 44B, and 49 show some damage.

NOBEOKA URBAN AREA

28/29 June: 117 B-29's dropped IB's on Nobeoka using radar and visual means in a night attack.

.515 sq. miles, or 36% of the built up area, was destroyed by this mission. Target 1314 and 1315 were minor-damaged.

NOBEOKA

SASEBO URBAN AREA

28/29 June: 141 a/c hit Sasebo in an all-incendiary night attack, bombing by radar and visually.

.41 sq. miles or about 17.9% of the urban and industrial areas were destroyed. This is 9% of the industrial area, and 20.4% of the urban area. Slight damage was caused to the Naval Dockyard and the Naval Arsenal and Engineering Depot.

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SHIMONOSEKI URBAN AREA

1/2 July: A/C bombing this target by radar and visually with IB's numbered 126.

The results were reported good with the main portion of the city destroyed. 36% of the entire built up area, or .51 sq. miles, was laid waste.

SI-60203-10

OKAYAMA URBAN AREA

28/29 June: 136 A/C made a night incendiary attack, dropping by visual and radar methods. One a/c went below the undercast and reported a conflagration with smoke rising to 20,000.

Complete coverage shows the main portion of the city destroyed as a result of this mission. Of the 3.38 sq. miles which constitute the built up portion of the city, 2.13, or 63%, are seen to be destroyed or damaged. Two unidentified industries, XXI 6241 and XXI 6242 are 95% and 80% destroyed, and the RR Yards have minor damage. Only the north and northwest portions escaped destruction.

OKAYAMA

TOKUSHIMA URBAN AREAS

4 July: 129 B-29's hit this primary target in a night incendiary attack.

Post strike photos show that 74% of the 2.3 sq. miles of built up area have been destroyed. This amounts to 1.7 sq. miles, constituting practically the entire town except for small parts in the east and west. Two small unidentified industries, XXI 6103 and 6108, have been destroyed.

TOKUSHIMA

TAKAMATSU URBAN AREA

4 July: 116 of the B-29's which struck 4 cities this night dropped incendiaries by radar and visual methods, with the result that a large portion of the western, central, and southern sections of the city is destroyed, while the eastern section is still covered with smoke.

Later photography shows that 1.4 sq. miles, or 78% of the built up area were destroyed by this mission.

TAKAMATSU

HIMEJI URBAN AREA

3/4 July: 107 a/c dropped IB's on this target at night, using visual and radar methods.

1.38 sq. miles or 71.8% of the built up portion of the city were destroyed. Of this total, about 1.12 sq. miles, or 58.3%, were the result of mission of 3/4 July. The portions of the city remaining undamaged are in areas to the north and southwest of the castle.

I-3mb  
-4mb-

KURE URBAN AREA

1/2 July: 152 a/c bombed by radar and visual methods at night, dropping incendiaries.

1.5 sq. miles, or 56%, were destroyed, representing the entire heart of the city. Only the extreme western and northeastern areas are not affected. The commercial/residential built up area of .91 sq. miles was 64% destroyed.

KURE

KUMAMOTO URBAN AREA

1/2 July: 154 a/c were over the primary target, dropping incendiaries in a night attack.

.8 sq. mile, or 16% of the built up portion of the city was destroyed.

0-103235X

197 - ATSUTA FACTORY - NAGOYA ARSENAL

As of 5 June it is seen that this plant has suffered damage from Missions 41, 44, 170 of 11 Mar, 18 Mar, and 17 May amounting to about 862,000 sq. feet, or 34% of the total roof area.

26 June: 16 a/c struck this plant visually, causing about 20.4% damage to the original roof area (508,800 sq. feet). The total damage to date is about 1,370,800 sq. feet or 55% of the original roof area.

The plant just south of #197, the Nippon Vehicle Manufacturing Co., Target 241, received 40% additional damage, bringing the total damage to 694,300 sq. feet, or 82.3% of the original roof area.

ATSUTA  
FACTORY  
NAGOYA  
ARSENAL



HODAGAYA CHEMICAL INDUSTRY COMPANY

74 of 85 a/c airborne dropped 144 tons of bombs visually on this plant with excellent results.

90 buildings, of a total of 135, are seen from post strike photography to be damaged or destroyed. This amounts to 474,300 sq. ft. or 61% of the plant roof area, most damage concentrated in the east and north sections.

Consultation with engineers familiar with Tetra-Ethyl plants indicates that lead was produced in the northwest portion of this plant. The northwest section was completely destroyed.

Revised estimates of the XXI BC place the damage at 458,000 sq. feet, or 59% of the total roof area, all damage being in the north and east portions. The southwest fourth is practically untouched.

UNIDENTIFIED CHEMICAL PLANT

KORIYAMA

12 April: 69 a/c of 82 airborne, visually bombed this plant with 262 tons from altitudes below 10,000 feet. The northern two-thirds of the plant is seen from post strike pictures to be heavily damaged, with all major buildings hit. 596,000 sq. ft. or 82.5% of the total roof area, either destroyed or damaged.

In a revised assessment of 15 April, the XXI BC estimates that the area affected totals 555,000 sq. feet, or 73% of the total roof area. The northern two-thirds of the plant is very heavily damaged and the whole plant is without doubt inoperative.

Y01-245 #  
02-004

TOKUYAMA COAL YARD

10 May: 59 a/c dropped 273 tons of HE's on this target visually from daylight formations. Results appeared excellent, with the majority of the bombs in the target area.

With extensive damage to the entire area, post strike photos prove this target to be completely inoperative.

TOKUYAMA  
COAL YARD

TOKUYAMA NAVAL FUEL STATION

10 May: Of 123 a/c which took off, 51 bombed this target with 232 tons, the majority of the remainder going to the other primary target, the Tokuyama Coal Yard. This was a daylight formation with attacks from 16,000 to 19,000 feet. Results were reported excellent with major damage inflicted.

Post strike photography shows extensive damage over entire area. With the exception of the new area to the east of the main plant (15% of the whole), this target is inoperative. The 12 storage tanks in the eastern portion are destroyed.

XXI BC photos of 16 June show that this plant is inoperative with 50% of entire roof area, about 52% of the by-products tanks, and all crude oil tanks either destroyed or damaged.

XXXXXX  
XXXXXX

OSHIWA OIL STORAGE

10 May: 75 of 88 a/c airborne dropped 374 tons visually from 17,500 feet. Results were reported from good to excellent.

It is seen from post strike reconnaissance that the present storage capacity of this plant is negligible. The southern two-thirds of the target has much damage with only one tank remaining with no visible damage. In the northern one-third of the plant, only four tanks appear operative. Of an original 65 tanks, about 18 are destroyed, 29 removed before the strike, 7 were being dismantled, and 6 were apparently unusable.

Photos of 16 May show 14 (75%) of the usable tanks and 9 (90%) of the buildings destroyed.

OSHIWA  
OIL STORAGE

OTAKE OIL REFINERY

10 May: 111 a/c, of 132 airborne, dropped 614 tons of bombs visually with strike photographs showing concentrations of bombs in the target area, plus a great deal of smoke.

With the exception of two small areas in the southwest and northeast corners of the plant, damage is distributed over the entire area. Post strike photography shows it out of operation. Approximately 45% of the plant installations are completely destroyed.

OTAKE  
OIL REFINERY

JAP AIRFIELDS

As a result of the Navy carrier strike at Japan, the following damage has been noted:

Mito Airfield has seven hangars and ten miscellaneous buildings damaged, plus 25 A/C damaged or destroyed.

Hokoda Airfield has 3 of 14 hangars and one A/C damaged, with 2 A/C destroyed.

Konoike Airfield has 5 of 7 hangars damaged, 4 other buildings partially destroyed, 21 A/C destroyed and 4 A/C damaged.

Naha, with eleven buildings destroyed, has a total of approximately 19,750 sq. ft. laid waste.

IZUMI AIRFIELD, KYUSHU

17 April: 22 of 24 a/c airborne dropped 80 tons of bombs visually with excellent results. This was in coordination with the Iceberg operation.

17 April: Strike photos show about 4 patterns of bombs bursting on the NE quarter of the field and hangar area where several fires are visible. Several hits are apparent on 2 hangars. Approximately 4 additional patterns of bursts are seen concentrated on the W side of the field, and in the dispersal area to the SW.

Three hangars show damage and 6 a/c are seen to be destroyed or damaged in post strike photography.

18 April: 23 a/c of 24 airborne, dropped 94 tons of frags and GP's by visual means with crews reporting encouraging results.

21 April: 13 a/c bombed this A/F visually.

22 April: 19 a/c hit the primary visually.

27 April: 21 a/c bombed visually.

28 April: 22 a/c bombed visually.



KOKUBU AIRFIELD, KYUSHU

April 17: In conjunction with the Iceberg operation 24 of 27 a/c airborne dropped 134 tons visually. This was a daylight formation strike and results were reported from good to excellent.

Strike photos show 2 patterns of bombs bursting in the N section of the field, across the N end of the servicing strip, and in the hangar area. No visible hits on A/C.

Post strike pictures show 9 a/c destroyed or damaged. 3 hangars show damage and fires are still burning in the residential areas. 50% of the field is covered with smoke at 171956Z.

18 April: 22 of 25 a/c airborne dropped 91 tons visually in a daylight formation raid on this target with results reported fair to excellent.

21 April: 34 a/c bombed visually.

26 April: 39 a/c bombed by radar.

27 April: 18 a/c bombed visually.

28 April: 17 a/c bombed visually.

30 April: 22 a/c bombed visually.

30 April: 7 a/c bombed visually.

3 May: 10 a/c bombed visually.

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KANOYA EAST AIRFIELD, KYUSHU

8 April: 7 a/c of 21 airborne dropped 79 tons of bombs through 10/10 cloud coverage. There were no observations reported.

17 April: of 22 a/c which took off to bomb this Kyushu A/F, 21 dropped 112 tons visually with reported excellent results.

Strike photos show 6 patterns of bombs bursting on the field and in the hangar area: 1 in the hangar area, 3 between hangars and runways, 2 on opposite (S) side of runway.

18 April: 33 of 36 a/c airborne dropped 76 tons of bombs by visual means with crews reporting various results.

21 April: 28 a/c bombed visually.

30 April: 14 a/c bombed visually.

30 April: 10 a/c bombed visually.

3 May: 11 a/c bombed visually.

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KANOYA AIRFIELD, KYUSHU

8 April: 29 a/c of 32 airborne, dropped 127 tons of HE's by radar through 10/10 undercast on the City of Kagoshima, the radar primary target. Kanoya was not attacked due to 10/10 cloud coverage.

17 April: Co-operating with the Okinawa invasion, 34 B-29's, of 42 which took off, hit Kanoya with 61 tons of frags and GP's. No bomb bursts were visible on the strike photography. 50 a/c can be seen destroyed or damaged from previous raids.

Post strike photography proves that damage from the 17 April strike includes about a dozen miscellaneous buildings, while some additional damage is seen to several hangars. The main hangars are obscured by clouds.

18 April: 20 B-29's of 21 airborne, bombed this airfield visually, with 137 tons of bombs, with results reported good to excellent.

21 April: 29 B-29's bombed visually.

22 April: 24 a/c bombed visually.

26 April: 3 a/c bombed by radar.

27 April: 22 a/c bombed visually.

28 April: 22 a/c bombed visually.

30 April: 18 a/c bombed visually.

30 April: 10 a/c bombed visually.

3 May: 8 a/c bombed visually.

5 May: 10 a/c struck visually.

7 May: 10 a/c bombed visually.

10 May: 10 a/c bombed visually.

NITTAGAHARA AIRFIELD, KYUSHU

17 April: 6f14 a/c airborne, 10 dropped 21 tons on this airfield visually. Strike photos show bombs away and falling, but no bursts on the ground. 6 a/c are identified as probably previously damaged.

18 April: Of 12 B-29's which took off, 10 bombed this target visually with 21 tons of bombs. This was a daylight formation raid in support of ICEBERG operations.

21 April: 22 a/c bombed visually.

26 April: 18 a/c bombed vy radar.

NITTAGAHARA  
APR 27

MIYAKONOJO AIRFIELD

- 26 April: 3 a/c bombed by radar.  
27 April: 14 a/c bombed visually.  
28 April: 18 a/c bombed visually.  
30 April: 22 a/c bombed visually.  
3 May: 10 a/c bombed visually.  
8 May: 17 a/c bombed the city of Miyakonojo.  
11 May: 10 a/c bombed the city by radar.

MIYAKONOJO  
A/7

Miyazaki Airfield

22 April: 22 a/c hit the target visually.

26 April: 48 a/c bombed by radar.

27 April: 21 a/c bombed visually.

28 April: 20 a/c bombed visually.

30 April: 19 a/c bombed visually.

3 May: 11 a/c bombed visually.

10 May: 7 a/c bombed visually.

11 May: 15 a/c bombed the town of Miyazaki by radar.

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IBUSUKI AIRFIELD - KYUSHU

5 May: 10 B-29's struke this target, visually.

7 May: 10 a/c bombed visually.

IBUSUKI  
A/F

CHIRAN AIRFIELD - KYUSHU

5 May: 8 a/c bombed this A/F visually with excellent results.

CHIRAN  
A/F



SAEKI  
A/F

SAEKI AIRFIELD

26 April: 19 a/c bombed by radar.

30 April: 11 a/c bombed visually.

4 May: 8 a/c bombed visually.

11 May: 7 a/c bombed visually.

TOMITAKA AIRFIELD

22 April: 18 a/c bombed visually.

26 April: 24 a/c bombed by radar.

30 April: 10 a/c bombed visually.

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KUSHIRA AIRFIELD

21 April: 27 a/c bombed visually.

22 April: 11 B-29's bombed visually.

27 April: 15 a/c bombed visually.

28 April: 21 a/c bombed visually.

30 April: 16 a/c bombed visually.

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USA AIRFIELD

21 April: 29 a/c bombed visually.

26 April: 19 a/c bombed by radar.

7 May: 11 a/c bombed visually.

10 May: 14 a/c bombed visually.

U  
S  
A  
A  
/  
F

MATSUYAMA AIRFIELD (SHIKOKU)

4 May: 17 a/c hit this target visually.

10 May: 18 a/c bombed visually.

M  
A  
T  
S  
U  
Y  
A  
M  
A  
A  
/  
F

IMABARI AIRFIELD

26 April: 15 a/c bombed by radar.

8 May: 11 a/c bombed the city of Imabari by radar with unobserved results.

IMABARI  
A/F

SECRET

*Phil.  
Will somebody  
had to write  
something. Red pencil,  
and return  
JRH*

EFFECTS OF XXI BOMBER COMMAND OPERATIONS  
ON JAP PRODUCTION OF ENGINES FOR COMBAT  
AIRCRAFT

1. The following exhibits attempt to show graphically what XXI Bomber Command operations have done to Jap capabilities in the production of engines for combat aircraft.

2. As a rough approximation it is estimated that the Japs had facilities for the production of 5,000 combat aircraft engines per month on 1 January 1945. Exhibit A, below, attempts to show, in very round numbers, a pre-1945 breakdown of this production among individual targets:

Estimated Combat Engines  
Per Month - 1 January 45

	Target	No. Per Month	% Jap Total
1.	90.20-193	2,000	40
2.	90.17-357	1,750	35
3.	90.25-1547	500	10
4.	90.20-2010/ 193	250	5
		<u>4,500</u>	<u>90</u>
5.	90.17-2009	} <del>500</del> 500	} <u>10</u>
6.	90.17-2008		
7.	90.30-660		
8.	90.17-1391		
		<u>5,000</u>	<u>100</u>
9.	90.17-356	}	}
10.	90.20-194		
11.	90.18-2011		
12.	90.21-2012		
13.	90.17-2097		
14.	90.14-2145		
15.	90.23-2153		
16.	90.24-2224		
17.	90.25-18		
18.	Other		
		<u>5,000</u>	<u>100</u>

3. Failure to attribute any engine production to Items 9 through 18 is compensated for by the probability of some moderate error on the high side for Items 1 through 8. Except

S E C R E T

for Targets 194 and 18 which are primarily airframe makers/assembly plants and only partially accredited with engine production, and 356 largely involved in production of engine components assembled elsewhere, the plants in Items 9 through 18 are new and probably were turning out a relatively modest proportion of total engine production as of 1 January 1945.

4. Damage and destruction to Japanese combat aircraft engine production is represented by the following table expressed in terms of monthly rate of production:

<u>Target</u>	<u>No. Per Month</u>	<u>% Jap Total</u>
1. 90.20-193	2000	40
2. 90.17-357	750	15
3. 90.25-1547	250*	5*
4. 90.20-2010/ 198	250	5
5. 90.17-2009	250	5
7. 90.30-660		
10. 90.20-194		
11. 90.18-2011		
12. 90.21-2012		
17. 90.25-18		
18. Other		
	<u>3500</u>	<u>70</u>

\* Assumed

5. It is difficult to express the actual damage and destruction accomplished at Target 1547 for purposes of the foregoing table - the attack on 19 January is estimated to have kept the plant out of production for about four months, so that we have quite arbitrarily taken a figure of 250 engines per month as representing the effects of the 19 January attack. In designating the figure of 250 engines per month as knocked out through destruction/damage to Targets 660/2009, we have been extremely conservative as we believe these two targets together produced more engines than targets 1391 and 2008, with which they were paired, in the tabulation in paragraph 2 above.

6. The table that follows presents, also in very round numbers, an estimate of Jap aircraft engine capabilities, expressed in terms of monthly rate of output, which represents objectives for future missions against the Jap aircraft industry:



S E C R E T

	<u>Target</u>	<u>No. Per Month</u>	<u>% Jap Total</u>
2.	90.17-357	1000	40
3.	90.25-1547	250	10
		<u>1250</u>	<u>50</u>
6.	90.17-2008 )	350	15
8.	90.17-1391 )		
		<u>1600</u>	<u>65</u>
9.	90.17-356 )	900	35
13.	90.17-2097 )		
14.	90.14-2145 )		
15.	90.23-2153 )		
16.	90.24-2224 )		
18.	Other )		
		<u>2500</u>	<u>100</u>

7. It should be noted that we estimate that the Japs, as of 15 June 1945, might find it possible to make engines at the rate of 2500 per month. It can be argued that this figure is far too conservative on the high side. In connection with 35% it should be noted that we have deducted only 750 engines from the first table (which itself probably was on the high side) still leaving Target 357 turning out 1000 engines per month. It will be noted that we credit TARGET 1547 with a capacity for turning out 250 engines per month, which is probably also on the high side since they may not yet have recovered 50% of their original capacity. In these instances, and in the case of other targets listed above, notably Targets 2008 and 1391, we have tried to reflect the pressure the Japs would put on older existing engine facilities to exceed all previous production because of the emergency created by our attacks. By the same token, it will be noted that contrary to the preceding two tables we credit remaining targets in the list with particular emphasis on "other" with 35% of the Japs present engine making potential. It probably could be argued, as pointed out, that the Japs probably cannot make more than 1500 combat engines per month, because none of these tables give any credit to the damage to smaller engine and engine component factories resulting from our urban area incendiary attacks, the damage to transportation also resulting from such attacks, etc. Perhaps some compromise figure, say 2000 engines per month, might be in order instead of the 2500.

JOHN R. HAAS  
Lt. Colonel, A.C.  
Target Section, A-2

SECRET

14 March 1945

MEMORANDUM TO GENERAL GILES

SUBJECT: Incendiary Attack on Nagoya

1. 307 B-29's took off from XXI Bomber Command bases on 11 March 1945 to deliver the second night all-incendiary attack against Japan in 48 hours. Target of this strike, which was second in size only to the earlier one against Tokyo, was the urban industrial area of Nagoya.
2. 284 aircraft put approximately 2000 tons of bombs on the primary, while only 2 attacked other targets. Bombs were dropped from altitudes of 5800 to 9000 feet, visually and by radar, with visibility reduced because of smoke and haze. Again each ship bombed individually with minimum time intervals, preceded to the target by 3 ships equipped with homing devices. The first 22 ships over marked the target area with M-47 incendiary bombs, the remaining aircraft dropping E-46 incendiary clusters set to open at 2000 feet.
3. Losses for this mission were kept at a minimum with only one aircraft unaccounted for. There were 17 early returns because of mechanical failures. The Island of Iwo Jima played an important part in the mission with 7 aircraft landing there for various reasons. Personnel casualties were extremely light with none killed, none seriously wounded, 2 slightly wounded and 8 missing. Enemy air opposition was generally unaggressive with 30 enemy aircraft making approximately 39 attacks. Claims of enemy aircraft were nil. 20 to 30 searchlights were observed at landfall. Heavy and medium flak, though generally inaccurate, was estimated from meager to intense, the automatic weapons fire being generally low and the heavy gun fire high. Some ground to air rockets were observed on the west side of Nagoya Bay.
4. The XXI Bomber Command, on the basis of post strike photographic coverage, estimates that approximately 47,600,000 sq. ft. of the city have been either destroyed or damaged with the larger portion contained in half a dozen irregular shaped areas centered approximately 2 miles South of Nagoya Castle.

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Listed industrial targets in or near the burned areas which suffered damage include the Aichi Hitoku Aircraft Plant, the Atsuta Factory of Nagoya Arsenal, Tsukiji Plant of the Daido Electrical Steel Company, the Nissan Chemical Plant, and Nagoya Harbor facilities. Other numerous small unidentified industries, scattered throughout the residential areas, were destroyed.

**CECIL E. COMBS  
Colonel, Air Corps  
Deputy Chief of Staff  
Combat Operations**

**SECRET**

DRAFT

12 Mar 45

On 10 March 1945, 325 B-29's took off from the Marianas to deliver a night all-incendiary attack against the Tokyo urban industrial area in the largest B-29 strike to date against the heart of Japan.

299 a/c bombed, of which 282 put approximately 1700 tons on the primary, 17 attacking other targets. The attack was made from altitudes of 5000 to 11000 feet through 1 to 7/10 cloud cover by individual a/c with minimum time intervals. Bombing a/c were preceded to the target by 4 homing a/c. The first 3 squadrons in dropped M-47 incendiaries, marking the target area for remaining a/c which dropped E-56 and E-28 incendiary clusters which were ~~xxxx~~ set to open 4500 and 2000 feet above the target.

26 early returns were reported. 3 a/c were lost over the target. 4 a/c  
Personnel casualties were none killed, one  
seriously wounded, 8 slightly wounded and 92 missing.  
ditched. 5 are missing, unaccounted for. / Enemy air opposition as reported

"weak and ineffective" with flak being "light to heavy, meager to intense but mostly inaccurate." No enemy a/c were claimed. Searchlights picked up most a/c from landfall to target. All searchlights, estimated 75 to 100 beams, went off during some of the bombing. Rockets were observed over the target area, barrage balloons observed ahead and to the right of course in the target area.